

Chapter 3: Graphical Methods for Describing Data

Name _____

1. The order of the questions in a survey can affect the results. This is thought to occur because issues raised in one question can affect responses to later questions. In 1974 a survey asked the following questions about doctors and lawyers:
 1. Would you say that most doctors in this country are really interested in the public good, or are most doctors just out to make a lot of money?
 2. Would you say that most lawyers in this country are really interested in the public good, or are most lawyers just out to make a lot of money?

The following table summarizes the responses to the lawyer question when these questions were asked in different orders.

Responses to lawyer question

Question order	% Public good	% Making money
Lawyer question asked first	26	74
Doctor question asked first	30	70

- (a) Construct a comparative bar chart for these response percentages,

(b) Do you think the order of the questions made a difference in the responses? Explain.

2. Desert organisms must cope with extreme and variable conditions. Their coping strategies frequently involve retreating to a sub-surface refuge. Researchers in New Mexico, investigating the underground shelter choices by Gila Monsters (*Heloderma suspectum*), hypothesized that depth might be a factor. They reasoned that deeper shelters would be less susceptible to extremes of heat and cold and thus depth would be preferred in a shelter. Depth data for 20 chosen shelters and 20 available shelters not chosen are presented in the table at right.

Shelter Depths (cm)

Chosen	Nearest	Chosen	Nearest
94	54	33	32
89	6	15	14
32	57	27	7
76	50	27	32
65	46	85	28
30	41	52	52
68	43	80	50
84	59	33	55
10	55	79	69
58	53	71	55

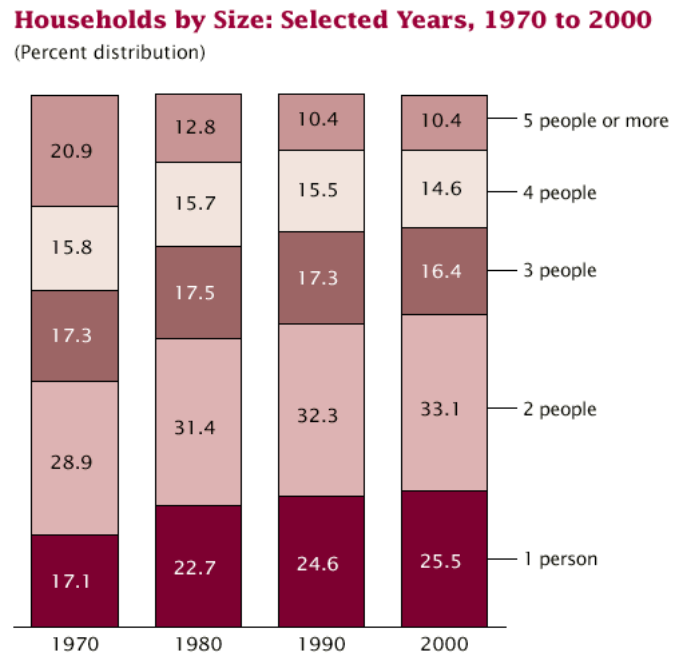
- a) Display these data using the a comparative (back-to-back) stem-and-leaf plot. Use the stems shown below, and be sure to include all information needed to compare the two distributions.

| 0 |
| 1 |
| 2 |
| 3 |
| 4 |
| 5 |
| 6 |
| 7 |
| 8 |
| 9 |

- (b) Describe the similarities and differences between the chosen and not chosen shelter depths.
- (c) Are these data consistent with the researchers' expectations? Explain, using specific aspect(s) of your plot in part (a).

3. As part of the United States Census, data is also collected on the number of persons in each household. The census data for four decades is summarized below.

- (a) In a few sentences describe how the proportion of households with 4 people has changed from 1970 to 2000.



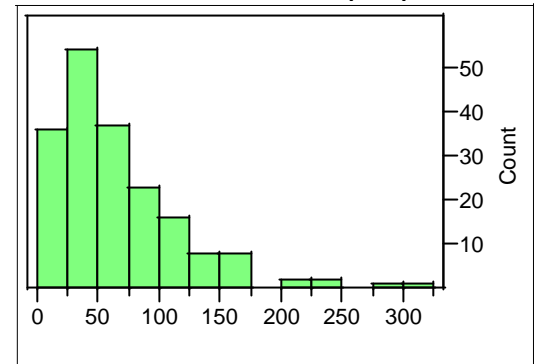
Source: U.S. Census Bureau, Current Population Survey, March Supplements: 1970 to 2000.

- (b) What size of household appears to have decreased the most from 1970 to 2000?

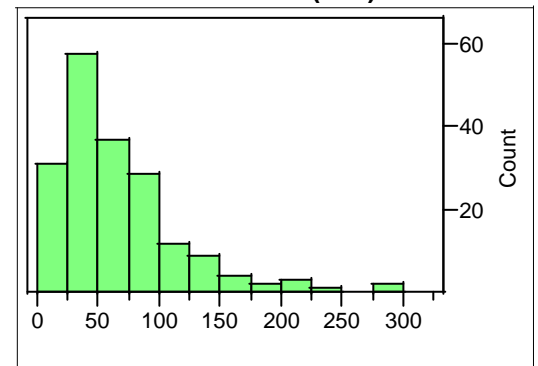
4. The average circumferences (distances around) in *mm* of the humerus, femur, and tibia of different species of mammals are displayed below. These long bones primarily support the body mass in mammals. Each data value is the mean circumference for the available measures for a single species.

- (a) Describe the differences and similarities in the distributions of these different mammalian bones.

Humerus Circumferences (*mm*)

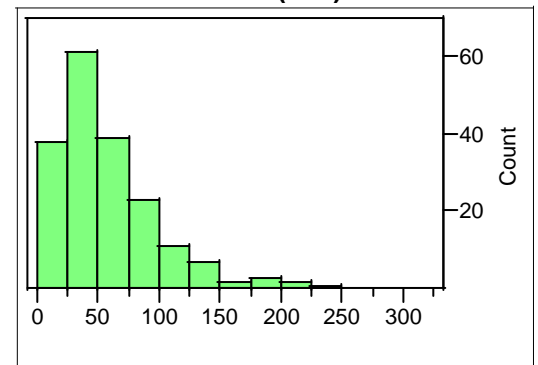


Femur Circumferences (*mm*)



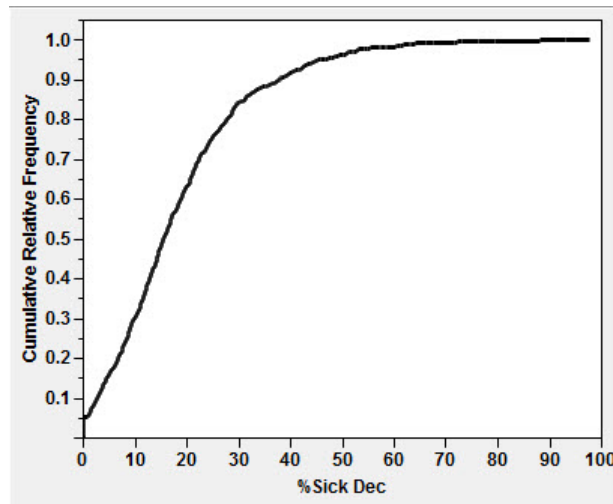
- (b) Biologists speculate that greater weights might be supported by larger bones. Based on the histograms, if the biologists' speculations are correct, which of these bones (humerus, femur, or tibia) would seem to be the least able to support a large weight? Explain, referring to specific aspects of the histograms.

Tibia Circumference (*mm*)



5. During the first six months of the American Civil War armies were amassed as never before in history. Large groups of men, transported far from home, lived in conditions that bred sickness. In a recent study involving Confederate muster rolls, a researcher constructed a cumulative relative frequency distribution of the percentages of Confederate soldiers reported sick for each company. A “Company” is a unit of soldiers, usually between about 70 and 120 in size. The cumulative relative frequency distribution for December, 1861, is shown below.

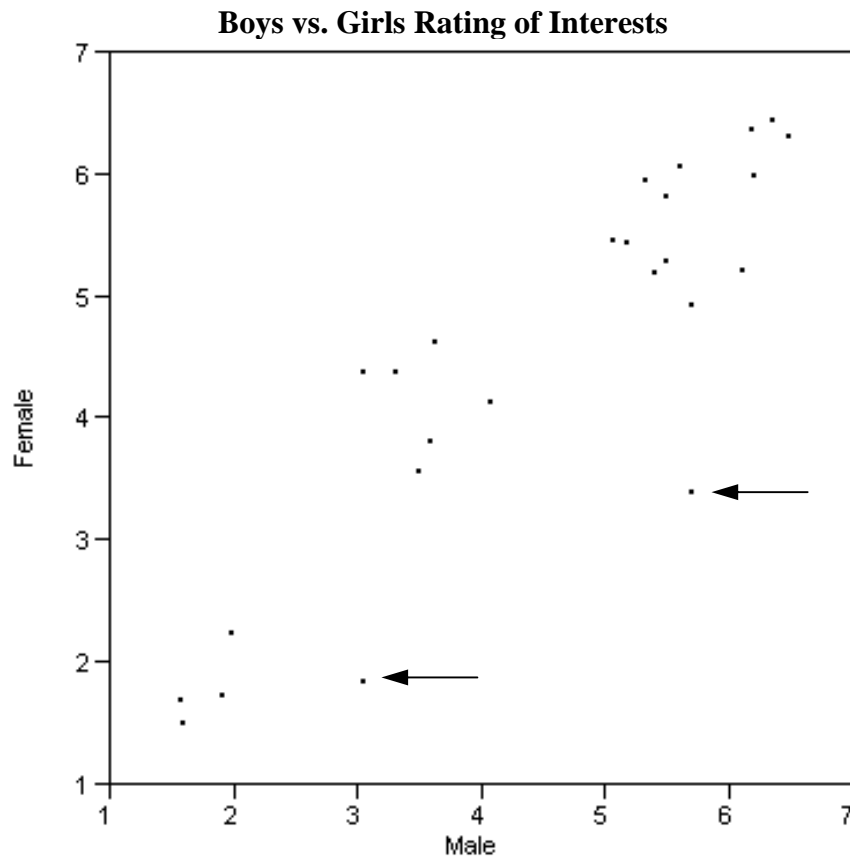
Cumulative Relative Frequency Distribution
Percentage reported sick by Company
December, 1861



- (a) Approximately what proportion of the Confederate companies had less than 10% sick?
- (b) Approximately what proportion of the Confederate companies had more than 30% sick?
- (c) Approximately 50% of the companies had less than what percentage of soldiers sick?

6. Investigators studying the relation between gender and the interests of early adolescents asked boys and girls in grades 5-9 to indicate on a 7-point scale their degree of interest in topics such as Life, Sports, and Cars.

The data in the scatter plot represent average levels of interest for boys and girls in grades 5 - 9. Each point represents one topic listed by the investigators. For example, boys average rating for "Opposite sex" as a 6.2, while girls on average rated their interest in this topic as 6.0 on the 7 point interest scale. This is recorded as the point (6.2, 6.0).



There are three interesting features of this scatter plot that you are to interpret below. What do you infer from each of these features of the scatterplot?

- (a) The points generally seem to scatter around the line, $y = x$.
- (b) There seem to be three clusters of points, one in the lower left, one in the middle, and one in the upper right of the graph.
- (c) There are two points (as indicated by the arrows) that do not seem to fit the overall pattern.